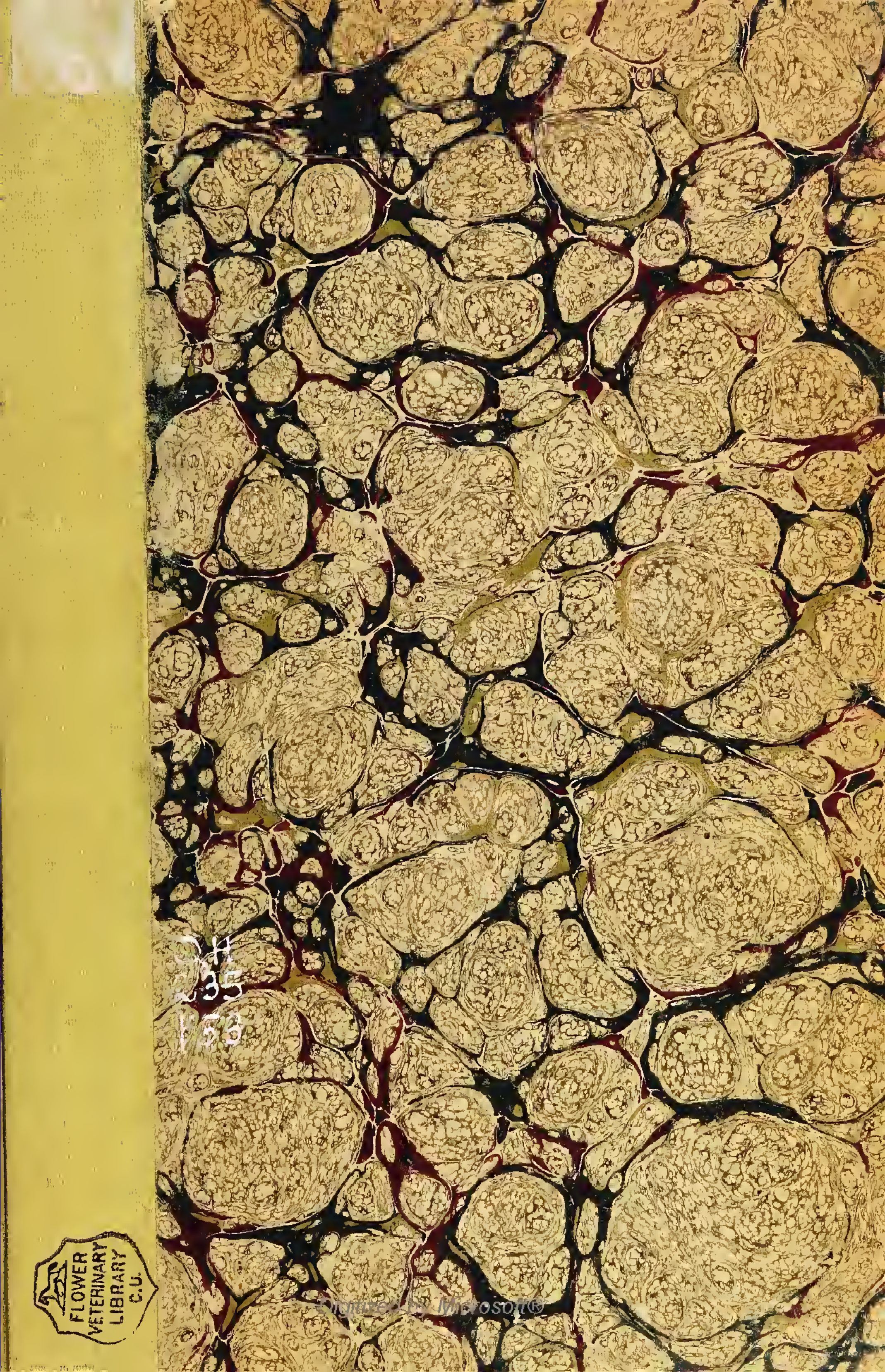

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The use of acetone in histology.

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The Use of Acetone in Histology.

PIERRE A. FISH.

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The Use of Acetone in Histology.

age 322 *Preliminary Note.*—Acetone, although not officially recognized by the United States Pharmacopœia, is, nevertheless, used to a greater or less extent in therapeutics and for technical purposes.

age 323 It is stated in the dispensatories that acetone is produced by the dry distillation of woods, acetates, gums, certain carbohydrates, etc., and has a specific gravity ranging from 0.7920 to 0.8008. It boils at from 56 degrees to 58 degrees C. It has an empirical formula of C_3H_60, although constitutionally it is Dimethyl-ketone, CO, CH_3, CH_3. It is soluble in all proportions in water, alcohol, ether, chloroform, and volatile oils, and dissolves pyroxylin, camphor, fats, and many resins.

Its action upon pyroxylin, with which this note has chiefly to deal, seems to be more intense than the customary ether-alcohol mixture. It dissolves not only the soluble-cotton form of pyroxylin, composed of the lower nitrates of cellulose, but the true gun cotton or hexanitrate of cellulose, which the ether-alcohol mixture cannot do.

The collodion process has attained such an importance in histological technique, that any modification in the way of abridging some of the numerous steps, provided the good results are not interfered with, should be worthy of note.

Fixative Action.—Acetone also possesses desirable qualities as a fixing, hardening, and dehydrating agent, retaining to some extent the natural color of some of the tissues; so that a piece of tissue hardened in it may be placed in a weak solution (4 per cent.) of acetone collodion, and then in a stronger solution (8 per cent.), mounted upon a block and immersed in chloroform; or if some other fixing agent has been used the tissue may be placed in acetone to complete the hardening and to prepare it for the collodion baths.

In addition to the fixing and dehydrating properties of acetone, it seems also to be useful as a solvent for many of the dyes used in histology. Further experimentation is, however, necessary. Another feature, which may be of some importance, is that the pyroxylin is very readily soluble in a mixture of equal parts of acetone and ether, and the official collodion is also freely miscible with the acetone collodion.

A table comparing the acetone and alcohol methods is herewith appended. If the fixing agent has been of an aqueous character, the process is lengthened

	6 per cent. Collodion (official).
	↥
8 per cent. Acetone Collodion.	3 per cent. Collodion (official).
↥	↥
4 per cent. Acetone Collodion.	Ether-alcohol.
↥	↥
Dehydration (strong acetone).	Dehydration (strong alcohol).
↥	↥
Fixing Agent (acetone 70 per cent).	Fixing Agent (alcohol 70 per cent).

(To be read from below upwards.)

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In the commercial acetone a small amount of water or alcohol may exist as impurities, and if this grade of acetone be used in making the collodion, the collodion may become opaque and require a longer time to clear when placed in Page 324 the chloroform. Not infrequently the chloroform itself is at fault, as it may also contain a slight amount of water. This difficulty is obviated or lessened by using pure acetone and pure chloroform. Those using the oil method of cutting collodion sections may abridge the process still further by omitting the use of the chloroform and immersing directly in the clarifying agent.

Incompatibility.—The question of incompatibility with the fixing agents ordinarily used is of considerable importance, but the fact must be kept well in mind that an incompatibility with a *solution* of the fixing agent when acetone is mixed with it, may be of quite a different character than when the *tissue*, hardened in the fixing agent, is brought in contact with acetone.

There is always some reaction between the protoplasm of the tissue and the fixer; the formation of various albuminates, etc.; as for example, when an equal amount, or excess, of acetone be added to a solution of potassium dichromate, a slight precipitate is formed, but not nearly equal, in amount, to the precipitate thrown down when alcohol is added to a solution of dichromate. If, on the other hand, a piece of tissue hardened in the dichromate be immersed in acetone, there is no perceptible precipitate for a long time, although the acetone takes on a yellowish tinge from the salt. The range of incompatibility, so far as determined, is decidedly less than that of alcohol.

Cost.—The cost of the chemically pure acetone averages from eighty to ninety cents per pound. Many specimens of the commercial acetone, however, seem to be quite free from water and to answer the purpose just as well as the chemically pure for histological uses, with the further advantage that its cost is only thirty or thirty-five cents per pound; and still lower rates may be obtained if bought in larger quantities.

To private workers, especially, who are not able to avail themselves of the facilities of college laboratories, the use of acetone would seem to be of considerable benefit. It is easy to procure; it is much cheaper than the usual ether-alcohol mixture, and shortens the process.

Acetone should not be confounded with aceton,—the latter being a proprietary grip and headache remedy.

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